

### **REMARKS**

Claims 1-29 were filed with the original application. Applicants affirm the election of claims 1-22 made with traverse during the telephone conversation with Examiner Ham on November 8, 2002. Claims 1-22 stand rejected. Claims 1 and 3 are amended by this Amendment. Upon entry of this Amendment, claims 1-22 will be pending and are presented for examination. Applicants submit that no new matter is introduced by the amendments, and that claims 1-22 are in condition for allowance.

#### **Amendments to the Claims**

Independent claim 1 is amended to recite that the substrate is mechanically stable and that the metal fitting has a thickness that is insufficient for independent mechanical stability. This amendment is supported at least on page 9, lines 23-32, reproduced below:

Handling of a very thin fitting can present mechanical difficulties. Hence, in some embodiments, a relatively thick fitting is fabricated and bonded to a substrate. After bonding, the fitting is thinned to a final thickness. The initial thickness can be chosen to provide mechanical stability during manufacturing of a device, for example, via a thickness of approximately 0.5 to 1.0 millimeter. A final thickness, can be chosen to provide maximum reflective efficiency as well as thermomechanical dominance by the substrate.

The Specification discloses illustrative thicknesses associated with this feature of the invention. For example, the above quoted portion of the Specification suggests that a thickness of less than approximately 0.5 to 1.0 mm does not provide sufficient mechanical stability for independent handling of the metal fitting, i.e., without the support of the substrate. As would be understood by one having ordinary skill, one cannot specify a single thickness value providing mechanical stability for all specific implementations of the invention because the mechanical stability depends on the specific material, shape and size of a fitting.

Moreover, the Specification includes explicit description of illustrative metal fitting thicknesses that are insufficient for independent mechanical stability:

The thickness of the metal fitting [after completion of fabrication of the device] is generally less than 500  $\mu\text{m}$ , and preferably less than 100  $\mu\text{m}$ . (page 4, lines 23-26)

[After bonding, a] fitting can then be thinned to a desired thickness ...a preferred thickness for many embodiments is less than approximately 125  $\mu\text{m}$ . (page 14, lines 28-29)

[T]he fitting can then be thinned to a desired thickness. A preferred thickness for many embodiments is less than approximately 125  $\mu\text{m}$ . (page 15, lines 27-29)

Dependent claim 3 is amended to preserve correct antecedent basis in view of the amendment to claim 1.

Accordingly, Applicants submit no new matter is introduced by the amendments to the claims.

#### Objections to the Drawings

The drawings are objected to under 37 C.F.R. 1.83(a) as not showing the feature of an "interference fit" as recited by claim 14. Examples of an interference fit, however, are shown at least in FIG. 6. This conclusion is supported by the following reasons.

The Specification describes an "interference fit" as a bond that relies on frictional forces between a fitting and a substrate. See, e.g., page 5, lines 5-7 (describing one bond as "an interference fit, or compression fit, [that] may be used to provide a bond via friction"). An interference fit can be obtained, for example, via heating to cause thermal expansion, and subsequent cooling after a substrate and metal fitting are positioned with respect to each other. See, e.g., page 7, lines 20-24 (describing an example in which "the fitting or the substrate is heated (Step 16) to assist the bonding (Step 12), for example, via an interference fit that utilizes thermal expansion and subsequent contraction").

Moreover, FIG. 6 illustrates a substrate (61) and fitting (62) that are bonded via frictional forces; the Specification explicitly describes the frictional bond illustrated in FIG. 6 as being, for example, an interference fit.

A device, for example, the embodiment illustrated in **FIG. 6**, can be fabricated without any material assisting the bond between the substrate and the fitting. A secure bond can be provided via frictional

forces between the substrate and the fitting. For example, a shrink fit, i.e., an interference fit, can provide such a bond. (page 11, lines 3-8)

Because an example of an interference fit is shown at least in FIG. 6, Applicants respectfully request that the objection to the drawings be reconsidered and withdrawn.

Rejection of Claims 1-22 Under 35 U.S.C. § 112, first paragraph

Claims 1-22 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, the Office action asserts that the scope of the term "metal fitting", recited in claim 1, has not been clearly defined in the specification. Applicants submit, however, that the specification, as filed, contains sufficient information regarding the claimed feature of a metal fitting to enable one skilled in the pertinent art to make and use the invention as recited by claim 1.<sup>1</sup> The following reasons support this conclusion.

The Specification and drawings clearly describe and illustrate several embodiments of appropriate materials for metal fittings, shapes of metal fittings, and methods for fabricating metal fittings. For example, the Specification includes the following disclosure.

[T]he invention involves devices, and methods for manufacturing devices, that have a preformed metal fitting bonded to a substrate. Forming a fitting prior to bonding the fitting to a substrate facilitates use of high-purity, low-resistivity metals [in a microwave device]. (page 3, lines 7-11, emphasis added)

By bonding a sufficiently thin metal fitting to the substrate, the thermomechanical benefits of the substrate are obtained in conjunction with the efficient reflectivity of a low resistivity metal fitting. (page 3, lines 20-23, emphasis added)

[I]n a first aspect, the invention features a device for manipulating microwave radiation. The device includes a substrate that defines the

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<sup>1</sup> See, e.g., MPEP § 2164.0 (stating that "the statute has been interpreted to require that the claimed invention be enabled so that any person skilled in the art can make and use the invention without undue experimentation. A patent need not teach, and preferably omits, what is well known in the art").

shape of a surface for reflecting microwave radiation. The substrate can define the shape, for example, of a microwave resonant cavity or a component that, more generally, reflects microwave energy. The device also includes a metal fitting conforming to the defined shape. The metal fitting provides the surface that reflects microwave radiation.

The metal fitting is preferably formed of a high purity metal, such as high purity copper, silver or aluminum. Bulk samples of metal, from which fittings can be fashioned, may be fabricated, for example, from a wrought metal sample. The metal sample can be prepared by casting, and by cold or hot working the metal. The fitting may consist of a metal that is at least 99% pure. (page 4, lines 3-18, emphasis added)

The metal fitting preferably has a thickness of greater than 10  $\mu\text{m}$  after completion of fabrication of the device. The thickness of the metal fitting is generally less than 500  $\mu\text{m}$ , and preferably less than 100  $\mu\text{m}$ . These thicknesses can limit the effect of the fitting on the size and shape of the device during thermal cycling. (page 4, lines 23-28, emphasis added)

The fitting can be bonded to the substrate via a variety of means. For example, a braze joint or an adhesive, for example, an epoxy, can be utilized. Alternatively, an interference fit, or compression fit, may be used to provide a bond via friction. Further, a combination of bonding means may be used.

The metal fitting can have a machined surface. The fitting may cover all or part of surfaces that are exposed to microwave energy. (page 5, lines 3-11, emphasis added)

Moreover, illustrative metal fittings are shown in several drawings, for example: FIG. 2, metal fitting 22; FIG. 3, metal fitting 32; FIG. 4, rectangular fitting 42; FIG. 5, tube-shaped fitting 52; FIG. 6, fitting 62; and FIG. 7, fitting 72.

For the above reasons, Applicants respectfully submit that the feature of a metal fittingly is clearly defined in the Specification. Applicants therefore request that the rejection under 35 U.S.C. § 112, first paragraph, of claim 1, and of claims 2-22, which depend directly or indirectly from claim 1, be reconsidered and withdrawn.

Rejection of Claims 1-22 Under 35 U.S.C. § 112, second paragraph

Claims 1-22 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Though the Office action states that claims 1-23 are rejected under 35 U.S.C. § 112, second

paragraph, Applicants assume that the Examiner did not intend to include withdrawn claim 23 in this rejection.

The Office action asserts that the feature of a "metal fitting conforming to the defined shape", recited in claim 1, is confusing as to whether it recites a method step or a structural limitation. The Office action also asserts that the feature of a "compatible thermal behavior", recited in claim 22, cannot be understood as to what would be considered as compatible. Applicants submit, however, that the feature of a "metal fitting conforming to the defined shape" recites a structural limitation, and that the feature of a "compatible thermal behavior", in light of the teachings of the application, reasonably apprises one of ordinary skill in the art of the claimed invention.<sup>2</sup> The following reasons support these conclusions.

The feature of a "metal fitting conforming to the defined shape", recited in claim 1, recites a structural limitation because, in light of the description and drawings of the application, the word "conforming" refers to a metal fitting having a shape that matches a supporting surface. It does not refer to a method of making the fitting conform, any more than a claim reciting interfitting members implies the step of making the members fit together.

For example, the Specification recites the following:

The device also includes a metal fitting conforming to the defined shape [defined by the substrate]. The metal fitting provides the surface that reflects microwave radiation. page 4, lines 9-11.

Adhesives can be used to assist or provide bonding. Pressure may be applied to the metal fitting to obtain a thinner adhesive layer and/or to deform the metal fitting to conform to a surface of the substrate. page 6, lines 1-4.

Regarding the feature of a "compatible thermal behavior", recited in claim 22, the Specification reasonably describes thermal compatibility, according to the principles of the invention. A metal fitting and substrate are compatible if the

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<sup>2</sup> See, e.g., MPEP § 2106, Section V(A)(2) (stating that "the definiteness of the language must be analyzed, not in a vacuum, but always in light of the teachings of the disclosure as it would be interpreted by one of ordinary skill in the art. Applicant's claims, interpreted in light of the disclosure, must reasonably apprise a person of ordinary skill in the art of the invention".)

substrate dominates the thermomechanical behavior of the device without causing, for example, deformation or cracking of the substrate under use conditions. For example, the Specification recites the following.

A very thin fitting can have additional benefits. For example, while a thicker layer attached to a CTE-mismatched substrate may deform or crack during thermal cycling, a very thin layer may be able to accommodate a substrate having a relatively small CTE. Thus the invention in part provides a device having a substrate and a metal fitting that have a compatible thermal behavior. That is, the substrate dominates the thermomechanical behavior of the device by imposing its response to temperature changes upon the fitting. (page 10, lines 6-15)

For the above reasons, the feature of a "metal fitting conforming to the defined shape" recites a structural limitation, and that the feature of a "compatible thermal behavior" reasonably apprises one of ordinary skill in the art of the claimed invention. Accordingly, Applicants respectfully request that the rejections under 35 U.S.C. § 112, second paragraph, of claims 1 and 22, and claims 2-21, which depend directly or indirectly from claim 1, be reconsidered and withdrawn.

*Rejection of Claims 1, 2, 4, 5, 10, 12, 13, 15 and 19-22 Under 35 U.S.C. § 102(b)*

Claims 1, 2, 4, 5, 10, 12, 13, 15 and 19-22 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 3,034,078 to McCoubrey ("McCoubrey"). Applicants respectfully submit, however, that McCoubrey does not anticipate amended claim 1 because McCoubrey does not teach all of the limitations recited by claim 1, as amended.

In contrast to the teachings of McCoubrey, amended claim 1 recites, in pertinent part, a device for manipulating microwave energy that includes a metal fitting having a thickness that is insufficient for independent mechanical stability. McCoubrey provides no teaching regarding a fitting having a thickness insufficient for independent mechanical stability.

In contrast to the subject matter recited by claim 1, McCoubrey teaches that two cylinders (12, 14) are formed from materials chosen to provide a constant diameter (d) of the interior surface (13) of the inner cylinder (12) while permitting the diameter (a) of the mating surfaces (15, 16) of the cylinders (12, 14) to vary

with temperature. See, e.g., McCoubrey, column 2, lines 41-50. McCoubrey provides no teaching at all regarding selection of a thickness for a metal fitting as it relates to mechanical stability of the fitting without support of a substrate.

For the above reasons, Applicants respectfully submit that McCoubrey does not teach a device for manipulating microwave energy that includes a metal fitting having a thickness that is insufficient for independent mechanical stability, as recited by claim 1. Therefore, independent claim 1 is patentable over McCoubrey. Because claim 1 is patentable over McCoubrey, Applicants submit that claims 2, 4, 5, 10, 12, 13, 15 and 19-22, which depend from claim 1, are patentable as well. Therefore, Applicants respectfully request that the rejection of claims 1, 2, 4, 5, 10, 12, 13, 15 and 19-22 under 35 U.S.C. § 102(b) be reconsidered and withdrawn.

Rejection of Claims 1, 4, 5, 13, 15 and 19-22 Under 35 U.S.C. § 102(b)

Claims 1, 4, 5, 13, 15 and 19-22 are rejected under 35 U.S.C. § 102(b) as being unpatentable over U.S. Patent No. 3,300,842 to Weill ("Weill"). Applicants respectfully submit, however, that Weill does not anticipate amended claim 1 because Weill does not teach all of the limitations recited by claim 1, as amended. In particular, Weill does not teach a metal fitting having a thickness that is insufficient for independent mechanical stability, as recited by claim 1.

Weill provides no teaching regarding a fitting having a thickness of a value that would be insufficient for independent mechanical stability of the fitting. Weill provides no teaching at all regarding selection of a thickness for a metal fitting as it relates to mechanical stability of the fitting.

For the above reasons, Applicants respectfully submit that Weill does not teach a device for manipulating microwave energy that includes a metal fitting having a thickness that is insufficient for independent mechanical stability, as recited by claim 1. Therefore, independent claim 1 is patentable over Weill. Because claim 1 is patentable over Weill, Applicants submit that claims 4, 5, 13, 15 and 19-22, which depend from claim 1, are patentable as well. Therefore,

Applicants respectfully request that the rejection of claims 1, 4, 5, 13, 15 and 19-22 under 35 U.S.C. § 102(b) be reconsidered and withdrawn.

Rejection of Claims 1, 4, 5 and 13 Under 35 U.S.C. § 102(b)

Claims 1, 4, 5 and 13 are rejected under 35 U.S.C. § 102(b) as being unpatentable over U.S. Patent No. 3,225,351 to Chatelain et al. ("Chatelain"). Applicants respectfully submit, however, that Chatelain does not anticipate amended claim 1 because Chatelain does not teach all of the limitations recited by claim 1, as amended. In particular, Chatelain does not teach a metal fitting having a thickness that is insufficient for independent mechanical stability, as recited by claim 1.

Chatelain provides no teaching regarding a fitting having a thickness of a value that would be insufficient for independent mechanical stability of the fitting. Chatelain provides no teaching at all regarding selection of a thickness for a metal fitting as it relates to mechanical stability of the fitting.

For the above reasons, Applicants respectfully submit that Chatelain does not teach a device for manipulating microwave energy that includes a metal fitting having a thickness that is insufficient for independent mechanical stability, as recited by claim 1. Therefore, independent claim 1 is patentable over Chatelain. Because claim 1 is patentable over Chatelain, Applicants submit that claims 4, 5 and 13, which depend from claim 1, are patentable as well. Therefore, Applicants respectfully request that the rejection of claims 1, 4, 5 and 13 under 35 U.S.C. § 102(b) be reconsidered and withdrawn.

Rejection of Claims 1, 4, 5, 12, 13 and 16 Under 35 U.S.C. § 102(b)

Claims 1, 4, 5, 12, 13 and 16 are rejected under 35 U.S.C. § 102(b) as being unpatentable over U.S. Patent No. 5,876,789 to Nakada ("Nakada"). Applicants respectfully submit, however, that Nakada does not anticipate amended claim 1 because Nakada does not teach all of the limitations recited by claim 1, as amended. This conclusion is supported by the following reasons.



Nakada does not teach a device that includes a substrate and a metal fitting where the substrate defines the shape of a surface for reflecting microwave radiation and the metal fitting conforms to the defined shape and provides the surface that reflects microwave radiation, as recited by claim 1. Rather than teaching the subject matter recited by claim 1, Nakada teaches that "a dielectric, pattern wiring and multi-layer board with any desired curved surface" can be produced with a combination of techniques. See, e.g., Nakada, column 6, lines 34-36. Nakada teaches that the curved surface of a board can be used "for mounting thereon an antenna element and its power supply circuit". See, Nakada, column 6, lines 40-41.

The Office action asserts that Nakada discloses "a metal fitting a1 [that provides a] surface that reflects microwave radiation." (Office action, page 6, next to last paragraph) Applicants respectfully submit, however, that Nakada teaches a board that includes a conductive layer (a1), but does not teach that the conductive layer (a1) provides a surface that reflects microwave radiation. Rather, as described above, Nakada teaches that an antenna element can be mounted on a board.

For the above reasons, Applicants respectfully submit that Nakada does not teach or suggest a device for manipulating microwave energy that includes a metal fitting having a thickness that is insufficient for independent mechanical stability, as recited by claim 1. Therefore, independent claim 1 is patentable over Nakada. Because claim 1 is patentable over Nakada, claims 4, 5, 12, 13 and 16, which depend from claim 1, are patentable as well. Therefore, Applicants respectfully request that the rejection of claims 1, 4, 5, 12, 13 and 16 under 35 U.S.C. § 102(b) be reconsidered and withdrawn.

Rejection of Claims 3, 6-9, 11, 14 and 16 Under 35 U.S.C. § 103(a)

Claims 3, 6-9, 11, 14 and 16 are rejected under 35 U.S.C. § 103(a) over McCoubrey. With regard to claims 3, 6 and 7, the Office action asserts that "the specific range of the thickness of the metal fitting is considered as a matter of design choice since the disclosure does not provide any criticality of such range and

thus, it requires only routine skill in the art". See Office action, page 7, fifth paragraph. As discussed above, however, Applicants respectfully submit that amended independent claim 1 is in condition for allowance. Accordingly, claims 3, 6-9, 11, 14 and 16, which depend from claim 1, also are in condition for allowance.

Moreover, and in contrast to the assertion that "the disclosure does not provide any criticality of such range", the Specification does disclose thickness values of a metal fitting that provide benefits not found in prior art microwave devices that have thicker metal fittings. As described above, with regard to the amendments to the claims, the Specification describes thicknesses that are insufficient for independent mechanical stability. Metal fittings having a thickness in a particular range, as recited by claims 3, 6 and 7, can provide, for example, thermomechanically stable devices, in which a substrate having a small CTE value dominates the dimensions of the device during thermal cycling. A device that is stable during thermal cycling can thus be obtained. See, e.g., page 4, line 31 to page 5, line 2, page 8, lines 29-31, and page 9, lines 29-32.

Rejection of Claims 2, 3, 6-12 and 16 Under 35 U.S.C. § 103(a)

Claims 2, 3, 6-12 and 16 are rejected under 35 U.S.C. § 103(a) over Weil. As discussed above, Applicants submit that amended independent claim 1 is in condition for allowance. Accordingly, claims 2, 3, 6-12 and 16, which depend directly or indirectly from claim 1, also are in condition for allowance.

Rejection of Claims 2, 3, 6-12, 14-16 and 22 Under 35 U.S.C. § 103(a)

Claims 2, 3, 6-12, 14-16 and 22 are rejected under 35 U.S.C. § 103(a) over Chatelain. As discussed above, Applicants submit that amended independent claim 1 is in condition for allowance. Accordingly, claims 2, 3, 6-12, 14-16 and 22, which depend directly or indirectly from claim 1, also are in condition for allowance.

Rejection of Claims 2, 3, 6-11, 14, 15 and 22 Under 35 U.S.C. § 103(a)

Claims 2, 3, 6-11, 14, 15 and 22 are rejected under 35 U.S.C. § 103(a) over Nakada. As discussed above, Applicants submit that amended independent claim 1 is in condition for allowance. Accordingly, claims 2, 3, 6-11, 14, 15 and 22, which

depend directly or indirectly from claim 1, also are in condition for allowance thereby rendering this rejection moot.

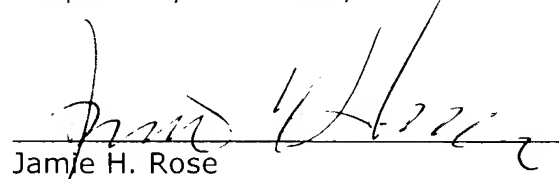
Rejection of Claims 17 and 18 Under 35 U.S.C. § 103(a)

Claims 17 and 18 are rejected under 35 U.S.C. § 103(a) over McCoubrey, Chatelain, Weill or Nakada in view of U.S. Patent No. 4,947,540 to Komachi. As discussed above, Applicants submit that amended independent claim 1 is in condition for allowance over McCoubrey, Chatelain, Weill or Nakada. Moreover, Komachi cannot supply what these references lack because Komachi alone or in reasonable combination with these references does not teach or suggest all the limitations recited by claim 1. Accordingly, claims 17 and 18, which depend directly or indirectly from claim 1, also are in condition for allowance.

**CONCLUSION**

In view of the amendments and arguments presented herein, Applicants respectfully request that the rejection of claims 1-22 be reconsidered and withdrawn, with claims 1-22 proceeding to issue. The Examiner is invited to call the undersigned, if the Examiner believes that a telephone conversation could be helpful in expediting prosecution of the instant application.

Respectfully submitted,

  
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